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ABSTRACT

Alternative models of organizational structure are discussed in this paper as they operate in higher and further education in Great Britain. First, the basic principles of the traditional hierarchical model of college organization are presented, and the advantages and disadvantages of this model are highlighted. Next, the paper discusses the Hatfield Development Plan, one of the first major plans suggesting radical organizational change in higher education. Then, the major features of the scheme in operation at Hatfield Polytechnic are explored in terms of the responsibilities of the academic board, the 5 schools of study and 37 academic groups into which the college is organized, the heads of the academic groups, and the directors of studies. After discussing two additional hierarchical structures based on faculties and departments or schools, the paper examines the main elements of a matrix structure, which involves the superimposition of a project management structure on an existing functional structure. The next sections discuss the use of the matrix structure in education through an examination of its operation at Strode College, the College of Nautical Studies in Southampton, Yeovil College, and the Colchester Institute. After discussing the functions, roles, and responsibilities of staff within the matrix structure, the paper concludes by contrasting the advantages and disadvantages of the hierarchical and matrix structures. (HB)

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ALTERNATIVE ORGANISATIONAL STRUCTURES IN HIGHER AND FURTHER EDUCATION

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ALTERNATIVE ORGANISATIONAL STRUCTURES IN HIGHER AND FURTHER EDUCATION

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During the last few years there has been a relatively small but none-the-less significant move in further education to find an alternative to the traditional hierarchical structure based on departments. It is interesting to note that this move is not unique to higher and further education, or indeed to education as a whole, but has spread and is spreading through industry and other parts of the public sector.

The origin and development of organisations as human institutions are not as clearly understood as might be considered desirable, perhaps because the definition of an organisation is not as clear cut as it might at first be thought to be. Some writers on organisation distinguish between "whole person" organisations where people as individuals are the component parts, and modern organisation where the component parts are made up of positions or roles (expectation as to how people will feel, think or act in their prescriptive positions) and the extent to which we accept these roles, become the component parts of the structure rather than a particular set of individuals, and the relationships between these individuals. Coleman has stated that this distinction between the whole person and role as the unit of which an organisation is composed "..... freed the individual from confinement by the group, and it allowed the creation of groups or organisations which were single purposed, cutting away most of the needs and interests of individuals".

Most of the key institutions in the past have been based on the hierarchical structure, possibly because this stems from the ancient patriarchal family where the head of the unit had total power. This historical precedent caused most institutional forms to be based on a hierarchical structure with hierarchical authority apportionment. The key concept in this structure is authority linked with power stemming from unitary control. Weber, in his classification of organisations (traditional, charismatic and rational-legal), has pointed out that the national-legal type which is the basis of bureaucracy has two key characteristics: (a) it is built on a scalar hierarchical principle; (b) it has a common goal towards which members work under accepted leaders exercising legitimate authority. He also stated that authority is by virtue of office held at a particular time. Organisations in higher and further education, in common with many other organisations, conform to these criteria.

THE HIERARCHICAL STRUCTURE

The basic principles of the hierarchical organisational structure are:

1. Task specialisation - the range of the organisation's activities, the services of special skills.
2. Scalar principle - the chain of command.
3. Unity of command - only one direct superior.
4. Span of control - a superior can direct the operations of only a limited number of subordinates.

Application of these principles has given rise to the classic organisation chart or tree structure (Figure 1 on page 537). The mode of working is essentially vertical. Decisions passed down the hierarchy (in this case from principal to head of department to section leader to lecturer) and problems are passed up until they reach a level at which a decision or a solution can be achieved. A side effect of the level of authority system has been the necessity of providing specialist staff outside the normal hierarchical level system to provide specialist advice and services to the different levels of authority, giving rise to the line and staff distinction. This can be seen in Figure 1 on the right hand side of the chart. There are many objections to the hierarchical structure; a common thread running through the objections is that this structure hinders communication laterally. To overcome this deficiency informal structures and information links must be developed if the organisation is to function effectively. Another major objection is this structure's vulnerability to human failure.

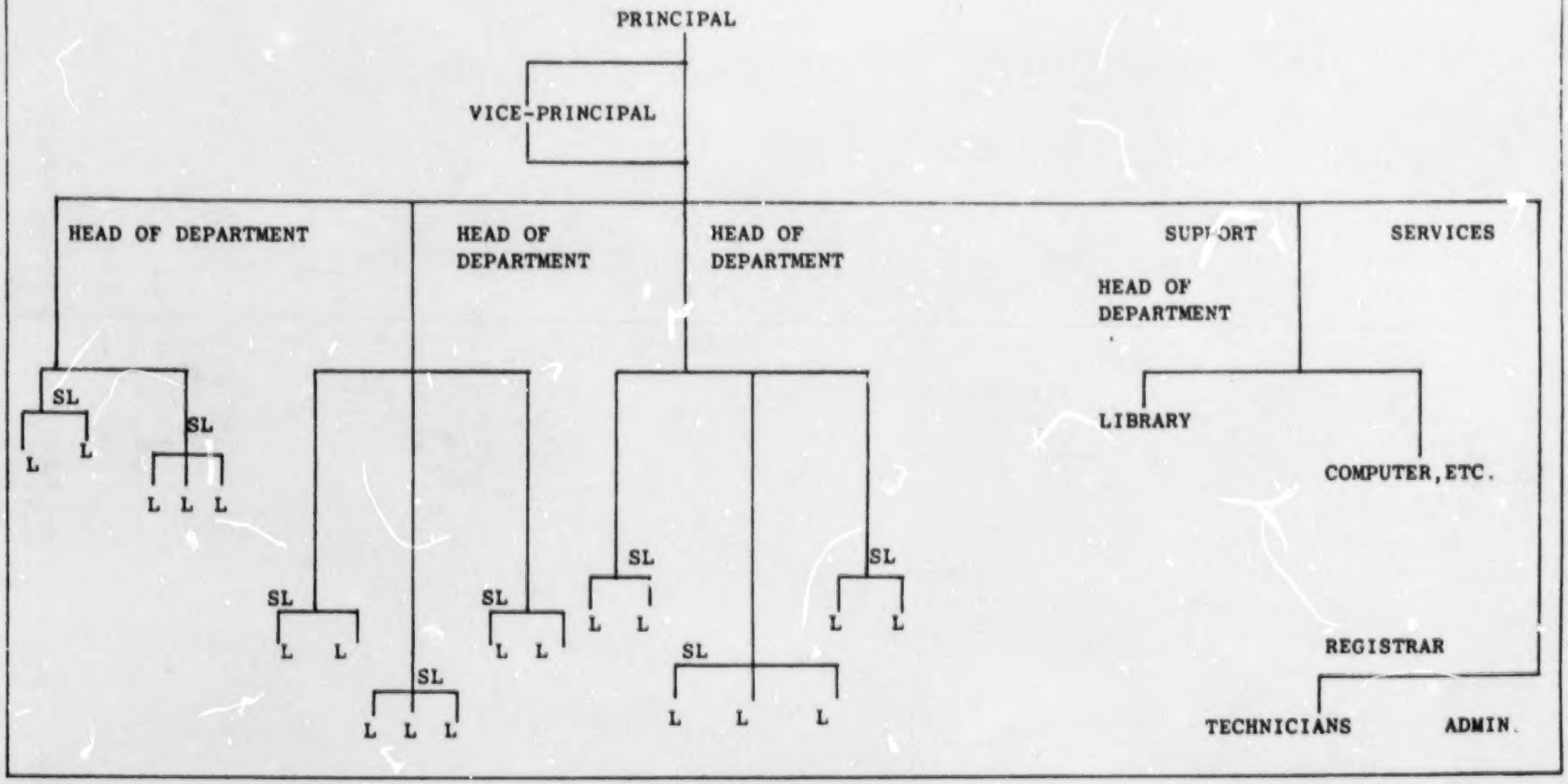
McGregor has pointed out that structures derived from highly authoritarian sources such as the church or military organisations are not necessarily appropriate for business, industry or social organisations. He argues that social, political and economic factors are very important. One might add that in educational organisations there should be a high consideration of educational factors.

Shepard has stated that "bureaucratic structures are designed to do programmable things in a stable predictable environment. More and more, programmable things can be mechanised and automated. More and more, the environment is unstable and rapidly changing. The present need is for modes of organisation which permit rapid adaptation to changing circumstances; the search is for ways in which people can organise for innovative, unprogrammable activities". He also said that new organisational requirements will result in a continuing decline in the emphasis on hierarchy and increasing reliance upon horizontal and diagonal informational flows.

However, it should be mentioned that there are very cogent arguments in favour of the hierarchical structure. The protagonists argue that just as one of the most fundamental

Figure 1

A CLASSIC HIERARCHICAL ORGANISATION CHART



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aspects of organisation theory is the hierarchical structure, so it is also fundamental to any general systems theory. Opponents say that the traditional approach in emphasising the scalar chain of command and vertical relationships neglected the horizontal and diagonal networks and the line and staff concept provided only a limited means of dealing with communication outside the vertical channel. They also point out that the systems approach is based on establishing information-decision networks which should include all relationships - vertical, horizontal and diagonal. They state that any form of management of complex systems would seem to presage the need for these networks. Many of these writers believe that new organisational requirements will result in a continuing decline in the emphasis on hierarchy and increasing reliance upon horizontal and diagonal information flows.

THE HATFIELD PLAN

The first murmurings of the need for something new in college structures emanated from some colleges in the home counties in the middle 1960s. They were initiated by senior staff who had noted the structural changes in non-educational areas and in the school sector and had felt that the existing hierarchical systems left a lot to be desired in organisations which had high technology, highly intelligent staffs and customers who were becoming increasingly vocal in their criticisms of the operation of the colleges in which they were studying and working. There were some short theoretically based papers suggesting various ideas for change, but the first major plan which suggested radical change was the Hatfield Development Plan.

This plan was in three parts. Part II, produced in May 1967, discussed four possible organisational structures:

1. A structure based on a departmental organisation with clearly defined lines of communication and levels of authority and responsibility.

2. A structure based on faculties. Within Hatfield this might have produced four faculties: arts, science, engineering and social science. Each faculty would have a dean appointed on a rotational basis.

3. A school structure which was described as an intermediate stage between a faculty and a departmental organisation. New style departments under this arrangement would tend to become smaller than the existing departments and each school would contain perhaps three of the new departments. It was essentially a hierarchical structure.

4. A matrix scheme. In this arrangement the academic staff was to be organised into academic groups around cognate subject

areas (about 30 were envisaged) with direct access to the academic board and its sub committees. Originally these groups were called divisions and a number of divisions would be attached to schools (12 in total) for administrative purposes. Each school was to have an appointed head. Thus the normal line management was replaced by a two way system crosscutting in a matrix with one direction being essentially administrative and the other being essentially academic.

Although the matrix organisation was accepted in principle by the academic board, the subsequent working party failed to agree on its implementation. Until 1974 Hatfield Polytechnic continued to operate on a departmental basis. In that year a new structure was introduced and although it has been operating for five years it is still being modified.

The Polytechnic is now organised into five schools of study and 37 academic groups. The schools are engineering, natural science, information sciences, social sciences, and humanities. Each is headed by a dean (Burnham head of department grade) on a rotational basis. Two deans are still in office after five years and in three schools a second dean is in office. Schools are responsible to the academic board for:

A. Schemes of Study

(i) Development of new schemes and programmes

(ii) Operation

(iii) Review

B. Students

(i) Admission

(ii) Supervision and welfare

(iii) Assessment (both academic and training)

C. Resources

(i) Deployment of non-academic staff and physical resources

(ii) Co-operating with groups in the deployment of teaching staff

(iii) Assessing future needs of all resources for the school, including the needs of academic groups attached to it, to discharge its functions.

Each school has sub-deans drawn from senior staff in the academic groups attached to the school, and a school board whose membership is as follows:

1 Dean of school

All sub-deans

All heads of academic groups attached to the school

10 Elected representatives of academic staff from attached groups

3 Heads of academic groups (or their representatives) from non-attached groups, by invitation or at the request of the academic board

Directors of studies, or advisors of studies

3 Non-academic staff

5 Students

2 Directorate (nominated by the director)

Polytechnic librarian or nominee

Director of computer centre or nominee,

The school boards report directly to the academic board.

The 37 academic groups which contain 420 members of staff are expected to teach right across the polytechnic but report to school boards and the appropriate dean for administrative purposes. Although the average strength of each group is 11 the actual size ranges from four to 18 members. Groups are responsible to the school board for:-

A. Schemes of Study

(i) Development of syllabuses for course units or modules

(ii) Teaching agreed course units and modules

(ii) Selection of student projects and providing supervision of them.

B. Students

(i) Examination of students

(ii) Supervision of student training at the request of a school board

(iii) Providing personal tutors at the request of a school board.

C. Resources

(i) Advising the school boards of the resources required for carrying out teaching and research commitments

(ii) Development and use of specialised and non-specialised accommodation and equipment allocated to the group

(iii) Deploying academic staff resources to best advantage.

Each academic group has a head (a transient appointment) who reports directly to the directorate of the polytechnic. The heads of groups value this access and wish to maintain it although some deans of schools feel that heads of groups should work through them. The heads of groups have the following terms of reference:

A. Teaching and research

(i) The effective teaching and assessment of his group's subject or subjects in all schemes in all schools and centres which employ the teaching of the members of the group.

(ii) The development of his group's academic subject(s), including the promotion of research by staff and by students of the polytechnic, and with maintaining liaison with current developments in the work of other academic groups in the polytechnic and, where this is relevant, in industry, research establishments, the profession etc.

B. Appointment, deployment and performance of staff

(i) Advising the director on the appointment of staff and the probation and promotion of the full members of the academic group

(ii) Negotiating with the relevant directors of studies on the allocation of teachers to programmes or schemes

(iii) The deployment and performance of all members, and the development and welfare and discipline of the full members of his academic group

(iv) Advising the director on the continuing development of staff in the academic group.

C. Resources

(i) In laboratory-based subjects, the effective development, utilisation and control of any laboratories allocated to the academic group by the school board

(ii) Advising the school to which the academic group is attached of the resources required for the effective teaching of the group's subject

(iii) Advising the director, after consultation with the deans, of the future staffing implications for the academic group of new academic developments in any school or centre.

Another group of key members of the academic structure are the directors of studies. These are school officers whose appointments are agreed by the director of the polytechnic on the recommendation of the school board. They are responsible for a set of courses or programmes of study. They report to the deans as required and are responsible for the operation, organisation and development of one or more of the school's schemes, under-graduate and/or post-graduate. In respect of these schemes of study they are responsible to the dean for:

1. Admission of students
2. Overall organisation of programmes of study
3. Negotiating with the relevant heads of academic groups on the allocation of teachers to programmes or schemes
4. Establishment and maintenance of advisory and tutorial services to students
5. Academic control and standard of professional training for these students, including their external placement and performance
6. Review and preparation of schemes for re-submission to CNAA or other validating body
7. Negotiating with those concerned for the allocation of laboratory facilities to programmes or schemes
8. Advising the school board on the appointment of external examiners after appropriate consultation
9. Serving as full members of the relevant board(s) of examiners; and as chairman if so appointed by the dean
10. Co-ordinating the work of scheme tutors, programme tutors, year tutors, etc.

A director of studies may also have analogous responsibilities for a group of research students.

Although it was thought originally that deans and heads of academic groups would be the key members of the academic structure with the directors of studies in a lesser role, the tendency now is to think of directors of studies as being of greater stature than heads of group.

A further review of structure is currently (late 1979) taking place. Those schools most concerned with laboratory and experimental provision (engineering and natural sciences) are tending to move towards a faculty structure. In engineering, for example, divisions such as civil, electrical, mechanical and industrial engineering have been set up, each with its own chairman. Each division consists of a set of groups. The other three schools do not seem to be moving in this direction. It may well be that two schools will have one structure and the other schools have another. It is interesting to note

that the size of the directorate has been reduced from five to three. This reflects the desire to devolve responsibility for academic development and deployment of resources to the deans of schools.

THE FACULTY

This type of structure has superficial attractions in that it reflects the unit of knowledge and avoids the excessive fission of the curriculum caused by a multiplicity of discipline based departments. It also has the attraction of usage by some of the more venerable educational establishments. It has, however, often become little more than a convenient grouping of academic staff for the determination of policy with no effective administrative systems operating. On the other hand, if the faculty is set up as both a useful academic grouping and an administrative unit, there is a danger that the monolithic academic hierarchy which is a feature of large departments will be accentuated with consequent rigidity of operation. If the head of faculty is not to become a full time administrator (which might reduce his academic effectiveness) there is the possibility of having the post on a rotational (even elective) basis with administrative authority but no academic authority over the heads of the constituent departments. While this reduces rigidity it also reduces the cohesion of the faculty as an administrative unit.

THE SCHOOL

The structure based on schools is designed to avoid a multiplicity of departments while avoiding the monolithic hierarchy of the faculty structure by having small groupings of cognate subject units (these could be called departments or another name indicating discipline) gathered together for both academic and administrative purposes. Ideally there should be some commonality of curriculum or a degree of inter-dependence of the constituent subjects. The grouping should be such that the head of school can exercise both administrative and academic responsibility for the constituent subject units. Thus the school exercises a high degree of co-ordination of these subject units and also takes over many of the departmental duties such as staffing, student admission, resource control, examination organisation, etc., leaving the constituent departments such duties as curriculum development, day to day staff control, staff development, etc. It should be emphasised that, like the two previous structures, it is essentially hierarchical.

THE MATRIX

The development of the matrix originated in the American aerospace industry to meet the Government's specific managerial requirements that work should be organised on a project basis. As a result the agencies carrying out this work superimposed the project management structure on top of the existing functional structure, thus creating the matrix. Thus two criteria were satisfied: the project axis allowed the emphasis at any period of time to be on the project, while at the same time the

functional structure was permanent and remained essential for the future of the organisation beyond the completion of the current projects. It ensured continuity by preserving, updating and developing the organisation's technical and human resources and its ability to set up future projects. It thus represented a compromise between the transient project type enterprise (students on courses in further and higher education) and the continuing resource based viability of the organisation.

Thus, there is a clear differentiation of the project manager from the functional manager. The project manager defines what has to be done, there is a joint determination of how to do it, and the functional manager finds the means to do it.

Protagonists of the matrix structure claim that it is based on a systems approach because it formally recognises the necessity for horizontal flows of information and work as well as vertical ones. They also claim that the matrix structure more effectively incorporates informal organisational links and encourages interdisciplinary approaches to problem solving. This can be seen to be quite important in an educational context. It should be noted that the project manager may have people in his project team and thus answerable to him, in so far as the project is concerned, who are 'senior' to him in the hierarchical system, e.g. a senior lecturer may be responsible to a lecturer in the project team. Thus there is a break with the basic chain of command principle and the project manager's authority is legitimated by the agreement of the team members to accept that authority for a period of time or for the achievement of a specific set of objectives. Obviously this agreement may be specific in that the team member has agreed to work as a member of that team or it may be general in accepting that the organisation presupposes acceptance of project team membership irrespective of substantive rank.

The project manager, therefore, has a new integrative role and has to resolve conflicts between the project team's needs and those of the traditional functional management. This shows a break away from vertical authority and has introduced an element of negotiation into day to day project management. In the non-educational context there may be no clear cut authority figure outside the matrix who can resolve conflict. Thus the project manager has to interact with a variety of functional departments to persuade them to provide resources and services needed by the project team. As far as education is concerned all organisations operating as a matrix do have such an authority figure, i.e. the principal or director.

It is quite common, particularly in educational circles, to hear matrix organisation contrasted with traditional hierarchical organisation as if they were the polarities of organisational structure, whereas it would be more correct to consider the polarities as hierarchical structure and the network structure. No component of the structure is in a position of overall control, although some components are more 'equal' than others and in its extreme form it represents almost complete anarchy. The matrix structure is more correctly positioned between the extremes of the quasi-anarchic network and the rigid hierarchy.

An essential feature of a matrix structure is that one 'junior' member operating in the matrix can and normally will be under the control of two 'bosses', the project manager and the functional manager and this may give rise to problems.

THE MIXED STRUCTURE

It should also be noted that one finds organisations which are not organised in a pure form as a hierarchy, a network or a matrix, but may be a mixture of the various structures. Thus one can find organisations which are part hierarchy and part network (the Roman Catholic Church is a good example of this), or part hierarchy and part matrix. One can find several examples of this in the educational field. Indeed it would be apposite to say that one can find more 'mixed' structures than pure structures when analysing organisational structure. An interesting example of this mixed structure is that of the Polytechnic of the South Bank with faculties and sub-faculty matrices.

THE MATRIX STRUCTURE IN EDUCATION

The matrix structure has been adopted in higher and further education by several colleges of widely divergent types, including Strode College, Yeovil College, Middlesex Polytechnic, the College of Nautical Studies in Southampton, and Colchester Institute. The structure of some of these colleges will be shown in diagrammatic form.

Strode College

This is a small tertiary college structured as shown in Figure 2 (page 546). Each senior tutor is responsible for academic standards and teaching arrangements in his group of subjects, control of resources, planning or resource needs, staff control and development, curriculum development, etc. Each course tutor is responsible for securing the allocation of staff resources for teaching on courses for which he is responsible to meet course objectives, monitoring the course, student admission and control, student reports, controlling examination procedures, etc.

It can thus be seen that the structure is discipline resource based in the vertical axis headed by senior tutors in the vertical columns (the functional managers) cross-cut by a course based network in the horizontal lines controlled by course tutors (the project managers). The duties of the senior tutors and of the course tutors are listed below.

Each senior tutor will be directly responsible to the principal for:

A. Academic standards and teaching arrangements in his group of subjects;

B. Control of material resources allocated to his group;

C. Forward planning of resource needs of the group;

Figure 2

STRODE COLLEGE

		Science Senior Tutor (S.L.)	Social Science Senior Tutor (P.L.)	Arts Senior Tutor (S.L.)	Management Senior Tutor (S.L.)	Technology Senior Tutor (S.L.)	
Course Tutor	A						GCE O Level
"	B						OND Business Studies
"	C						Secretarial
"	D						HNC Business Studies
"	E						GCE A Level
"	F						
etc.							

D. Discipline of staff in his group and of students attending group classes;

E. Preparation of teaching and assessment arrangements and schedules;

F. Syllabus development generally and specifically to accord with curriculum changes or other development which may be initiated in the college;

G. Staff development of members of his group;

H. Collaboration with other senior tutors and course tutors in respect of those courses to which his group contributes;

I. Participation, as occasion demands, in representing the college externally;

J. Providing confidential reports on members of staff of his group and on students' progress and attainment potential, when such reports may be properly given;

K. Such other matters as may reasonably be asked of him by or on behalf of the principal.

Course tutors will, in respect of their course role, be responsible to the principal for:

A. Liaising with the appropriate senior tutors whose groups contribute to the teaching of the course concerned to secure the allocation of adequate and suitable staff resources to meet course objectives and curricula;

B. Monitoring the above arrangements during the progress of the course concerned;

C. Being involved singly or as a member of a team to be established for this purpose for the selection and admission of students;

D. Knowing personally all the students in the particular course and providing information about the course requirements and qualification to which it leads;

E. Referring personal, academic or administrative problems of course students to appropriate colleagues in the college;

F. Providing student progress reports in collaboration with senior tutors when the need arises;

G. Discussing course and student progress with parents or contributory schools, or appropriate external organisations, in accordance with such policy as the college may collectively determine;

H. Acting as chairman for teachers', examiners' or assessors' meetings as required and co-ordinating the business of such meetings;

Figure 3

THE COLLEGE OF NAUTICAL STUDIES

Director

Chief Administrative Officer — Deputy Director

Deputy Director — Head of Senior Department

Deputy Director — Head of Cadet Department

Specialised Short Courses	Subject Leader + 3 Staff		
Navigation	1 Lecturer	Subject Leader + 4 Staff	6 Staff
Seamanship		2 Staff	Subject Leader + 6 Staff
Mathematics	Subject Leader	1 Lecturer	2 Staff
General Ship Knowledge		Subject Leader + 2 Staff	1 Lecturer
Marine Science		3 Staff	Subject Leader + 1 Lecturer
Meteorology and Oceanography	1 Lecturer	Subject Leader + 1 Lecturer	
Ship Operations		Subject Leader + 1 Lecturer	
Complementary Studies			Subject Leader + 1 Lecturer
Correspondent Course	Subject Leader		

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1. Such other matters as may reasonably be asked of them by, or on behalf of, the principal.

The College of Nautical Studies, Southampton

An interesting version of the matrix is in use at The College of Nautical Studies where some of the advantages of the matrix have been combined with a hierarchical structure. This can be seen in Figure 3 (page 548).

A copy of the terms of reference of the heads of department and of the subject leaders is shown below. Heads of department have a definite course/student bias in their responsibilities but also have a monitoring function in relation to standards of tuition and specific departmental responsibilities as listed under Figure 3.

The subject leaders are specifically oriented to the subjects they control. They are responsible for the teaching and development of that subject and for the development of the staff teaching it. However, it should be noted that the heads are responsible for submitting the recommendations for individual staff development and for submitting both subject and departmental estimates, although the subject estimates are raised by the subject leader.

HEADS OF DEPARTMENT - TERMS OF REFERENCE

1. Is responsible for students in courses within his department:
   (a) To arrange acceptance procedures and ensure compliance with any course rules.
   (b) To organise such monitoring of his students' academic progress as approved by the academic board.
   (c) To produce student reports as required and maintain full details of students' records on file.
   (d) To control the residence allocated to his students and the behaviour/discipline of the students at all times.
   (e) To refer recommendations regarding student removal to the director.
2. Is responsible to the academic board for the courses within his department:
   (a) To monitor the standards of tuition within his courses and consult with the appropriate subject leader regarding any decline in standards.
   (b) Except where specified by course regulations will, in consultation with subject leaders, determine the periods of allocation of the various subjects within the course timetable.

(c) In co-operation with other departments, produce termly timetables for his courses, staffed as advised by the subject leaders.

(d) Will organise such examinations as may be required within his courses, in accordance with any rules which may apply.

(e) Will make all necessary reports to the academic board and present any proposed courses or modifications to the board for its approval.

(f) Will authorise the issue of handouts approved by subject leaders.

(g) Will ensure that "work-books" are maintained and up-dated as necessary.

(h) Will be responsible for publicity of courses in an approved manner.

3. Is responsible for departmental administration:

(a) In conjunction with other departmental heads and subject leaders, programme staff vacations and total teaching commitments in accordance with the conditions of service.

(b) Will undertake such documentaton as may be required for his staff.

(c) Will be responsible for efficient communications with the staff assigned to his department.

(d) Will receive recommendations regarding individual staff development and promotions and present such at the appropriate place.

(e) Will ensure that registers are maintained and completed as required by the end of each term.

(f) Will receive subject estimates and raise departmental estimates and submit both as required. He will also authorise expenditure for both department and subjects within the approved amount (with the exception of capital items).

4. In addition to the above responsibilities heads of departments will undertake the following specific responsibilities throughout the school:

(a) <u>Head of executive training</u>:

The management of all vessels and all practical seamanship work both ashore and afloat.

(b) <u>Head of senior department</u>:

The library.
Visual aids and classroom equipment.
Induction of new staff.

SUBJECT LEADERS - TERMS OF REFERENCE

1. To be responsible for the efficient teaching and development of their subject throughout the school.

2. To maintain and update correspondence courses in their subject.

3. To organise and programme subject lecturers to ensure coverage and back-up of their subject at all grades.

4. Advise the heads of departments regarding the allocation of individual staff to classes in accordance with their programme in 2.

5. To supervise staff development in their subject and to recommend individual lecturers for:

   (a) Secondment

   (b) Attendance on courses, conferences and seminars

   (c) Promotion

6. To be responsible for the production of subject syllabuses and associated teaching programmes for courses specified by published syllabuses or approved by the academic board.

7. To be responsible for the maintenance and development of subject resources and equipment.

8. To approve teaching hand-outs.

9. To be responsible to the appropriate head of department for:

   (a) The compilation of examination papers in their subject, in accordance with the requirements of the particular examination rules.

   (b) The marking of the candidates' scripts, in accordance with the examination rules.

   (c) The completion of all course work, home-work and labwork marks analyses.

   (d) To approve all internal examination papers and supervise the marking thereof.

10. To prepare estimates for the subject in the appropriate mode and to raise orders within the approved revenue allocated to the subject.

Yeovil College

Yeovil College, a tertiary college established in Somerset in 1974, has a matrix structure based on 15 schools (plus agriculture and horticulture) and four deans of studies.

The teaching staff is organised in schools which are based on subject disciplines or groups of associated disciplines. They are appointed to the college - not to schools. Indeed, they

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may be members of more than one school if they teach in two disciplines. (They are associate members of their second discipline school.) Each school is under the direction of a head of school who is responsible for the maintenance and development of academic standards, budgetary control, estimates of expenditure, staff in the school, teaching resources allocated to it, servicing courses provided by the deans, and the preparation of staff timetables in consultation with the deans.

The deans are responsible for the admission and oversight of students and for the preparation, provision and administration of courses as listed below:

1. Responsibility for the admission of students, full and part time.
2. Arranging student's programme of studies and timetables.
3. Maintenance of student records, registration, reports and references, assessment procedures.
4. Monitoring of student's progress and welfare, careers and higher education, discipline, guidance.
5. Preparation, provision, administration and development of courses of study.
6. Liaison with heads of schools in the staffing of courses.
7. Liaison with senior staff in secondary schools.
8. Liaison with employers and parents, professional bodies and higher education institutions.

Colchester Institute

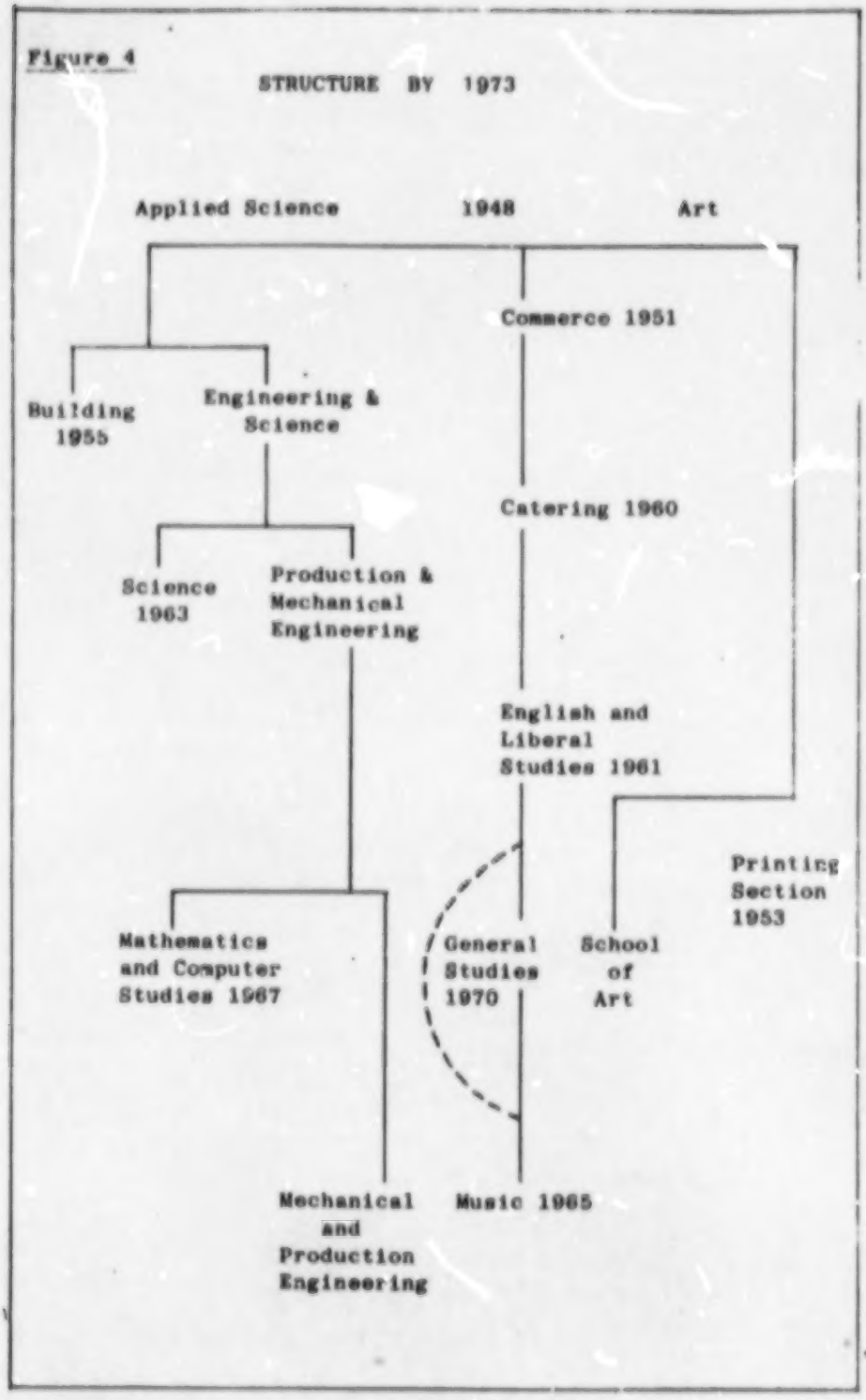
This institution was formed as a result of merging the North East Essex Technical College and School of Art, and the St. Osyth's College of Education. It was decided even before the official formation that the structure should be on a matrix basis to distinguish between the provision and development of subject expertise and the organisation and operation of the courses offered, as well as ensuring that the most effective use is made of resources provided. The Colchester College was originally formed in 1948 with two departments, applied science and art. These have since multiplied by division and addition over the years to form the multiplicity of departments shown in Figure 4 (page 553).

This was felt to be rather messy from an organisational point of view and was criticised for lack of horizontal communication, and because there was considerable difficulty in setting up broadly based courses due to the various departments operating as separate little empires with little communication between them. To overcome this problem a [redacted] structure was instituted on a faculty basis and this is shown in Figure 5 (page 555).

With the approach of the merger the new directorate felt that it would be fruitful to the exercise to carry out a diagnosis

Figure 4

STRUCTURE BY 1973



of purpose and it was decided that a course was a system of bundles of students to which various resources, such as staff were to be applied. Using this model they analysed and compared the situation in the school and the college as an interface between students and staff with the subject as a lubricant, whereas in a university the interface is between student and subject with the staff as a lubricant. The new directorate had strong feelings that, without wishing to ape the university model, there was need for a movement from the first interface to the second. The problem was - how to do this and achieve the other objectives which would be needed in the approaching merger.

There were two distinct possibilities; one, to operate the two existing organisations as a rather loose federation of two separate institutions and two, to stitch the whole thing together to form, initially, a fifth faculty. It was felt that a simple seam stitching exercise would be neither educationally sound nor organisationally desirable for a variety of reasons, e.g. it would continue the existing attitude of stasis which had developed in both institutions, it would increase and perpetuate the existing friction between faculties, it would not provide the necessary focus for change that the majority of staff needed. For these and other reasons it was felt that a radical change was desirable.

One early decision was to have a reasonably large and powerful academic board (possibly 80+). One objective of this (despite the obvious objection to a large committee on the grounds that the larger the committee the more difficult the decision making) was that it was intended ultimately to make this body the academic management board. One difficulty in the management of new large public sector colleges was that of prescribing boundaries. Where does the LEA stop? What powers should the governors retain? What powers are internalised in the institution?

The constraints on universities are quite different from those to which further education establishments are subject and boundary management assumes great importance. The Colchester directorate felt that the best solution was to eliminate the divisive boundary between the academic board and the governing body by making the academic board the body which runs the institution while the governing body would set policy within the boundaries prescribed by the LEA. The academic board would suggest courses of action to the governing body who would in practice give their seal of approval (the rubber stamp). It was realised that there was a danger that this might make the governing body redundant, but this was a confidence exercise with total participation.

To bring this and other changes about it was mooted that the new institution should be structured organisationally on matrix lines and it was decided to have a matrix with three axes: the staff and their subject expertise, the students and their course needs and the resources of the institution. Thus there are three discrete structures operating into the matrix and these can be seen in Figures 6 and 7 (pages 557 and 558).

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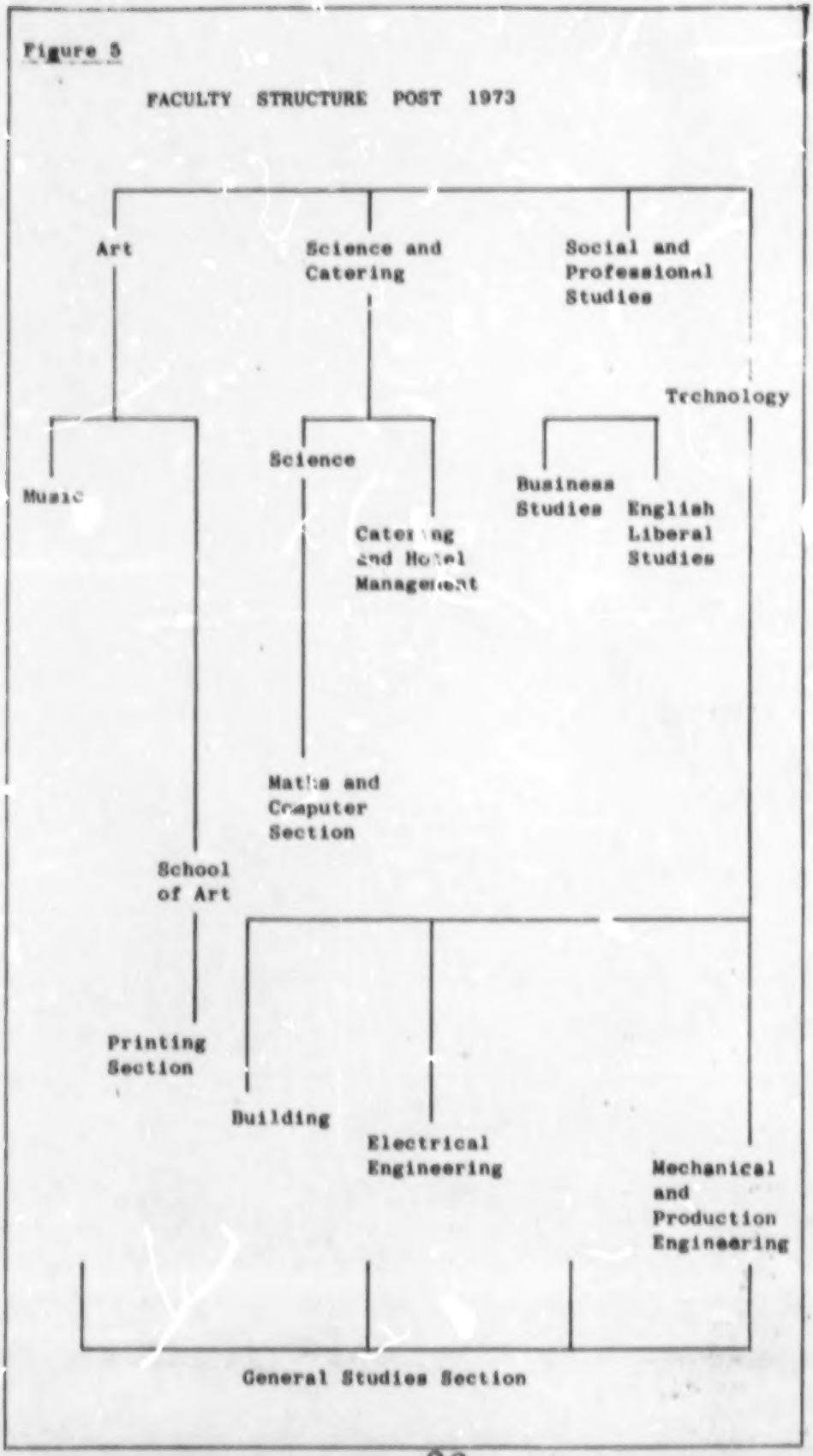
Figure 5

FACULTY STRUCTURE POST 1973



The subjects remain in a faculty structure. These are art and music; technology; catering and business studies; and sciences, humanities and community studies. These are controlled by a faculty head who is responsible to the academic board and the directorate. They have responsible to them some 20 area heads who are responsible for the management of a related group of subjects. In turn they have responsible to them subject leaders who are responsible for their subject either within the faculty or, where appropriate, across the college. The subject teachers are thus responsible to this subject leader for their subject. Detailed job descriptions are given below. The course axis is structured on the basis of having course co-ordinators responsible to the directorate for related groups of courses on an institute wide basis. They in turn have course tutors responsible to them for individual courses and for all years and teaching groups of a particular course. Responsible to them are year tutors who have responsibility for a particular group of students as, for example, one year of a particular course.

The third axis is controlled by the resource heads for material resources, human resources and administration. Day to day operation of resource groups is the responsibility of resource heads. They have the following duties:

Administration	Human Resources	Material Resources
Registry, registrar etc.	Student welfare	Library
Examinations	Student guidance	Educational technology
Public relations	Careers	Reprographics
Finance	Restaurants	Technical services
Records and files	References	Transport
Secretarial services	Staff welfare	Accommodation
Maintenance of buildings and grounds	Staffing	

FUNCTIONS AND DUTIES OF STAFF AS ORIGINALLY SPECIFIED

Outline definition of roles and outline function for the various categories of staff in the matrix are given below. It must be stressed that (a) it is possible for one member of staff to fill more than one role; (b) while the definition of role is reasonably accurately specified, the duties are only outlined and have, in some cases, been modified in the light of experience.

Faculty Head

A person responsible for the co-ordination of work in a group of schools with particular responsibilities to the director as follows:-

1. Co-ordination of operation of schools within the faculty.

Figure 6

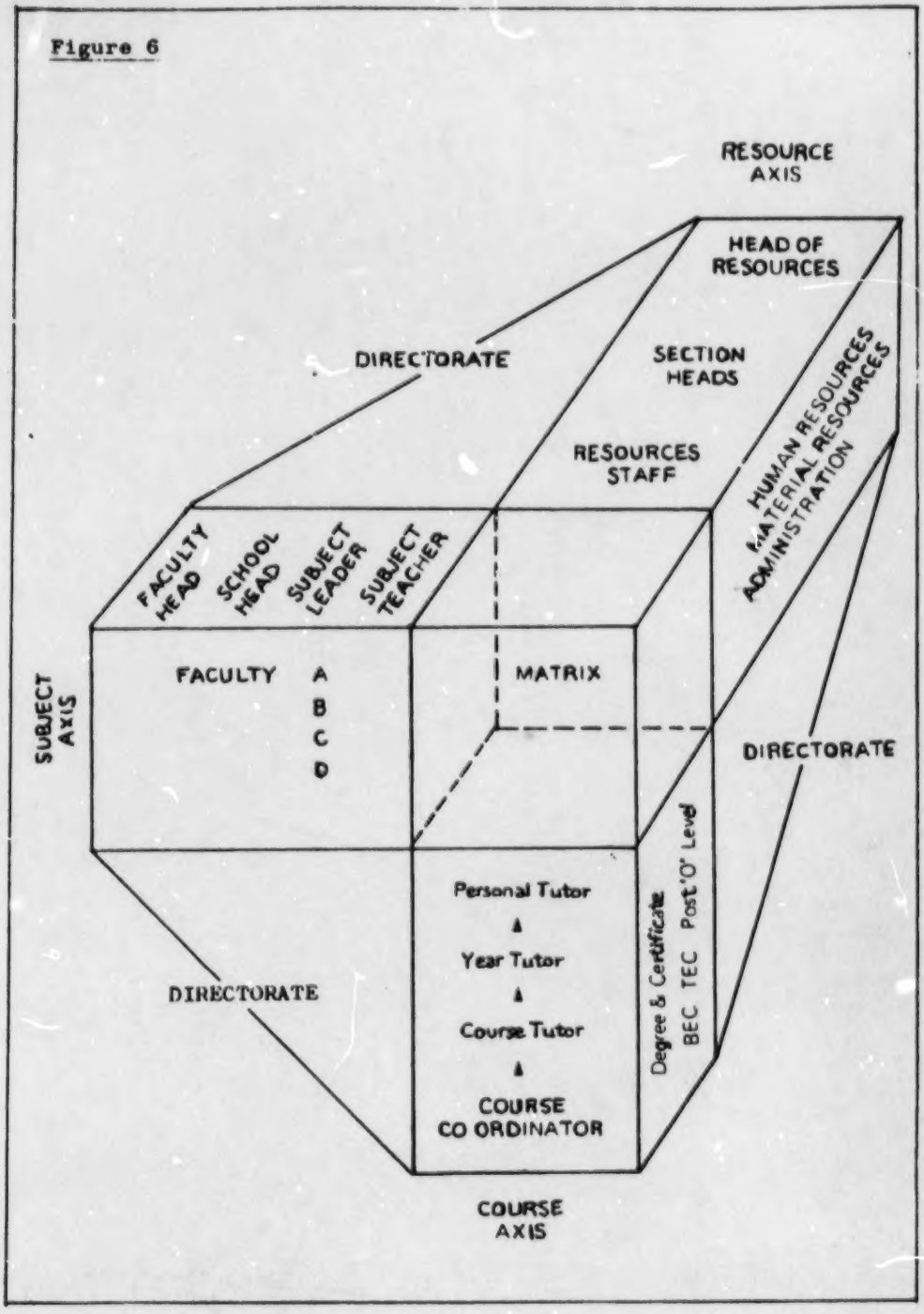
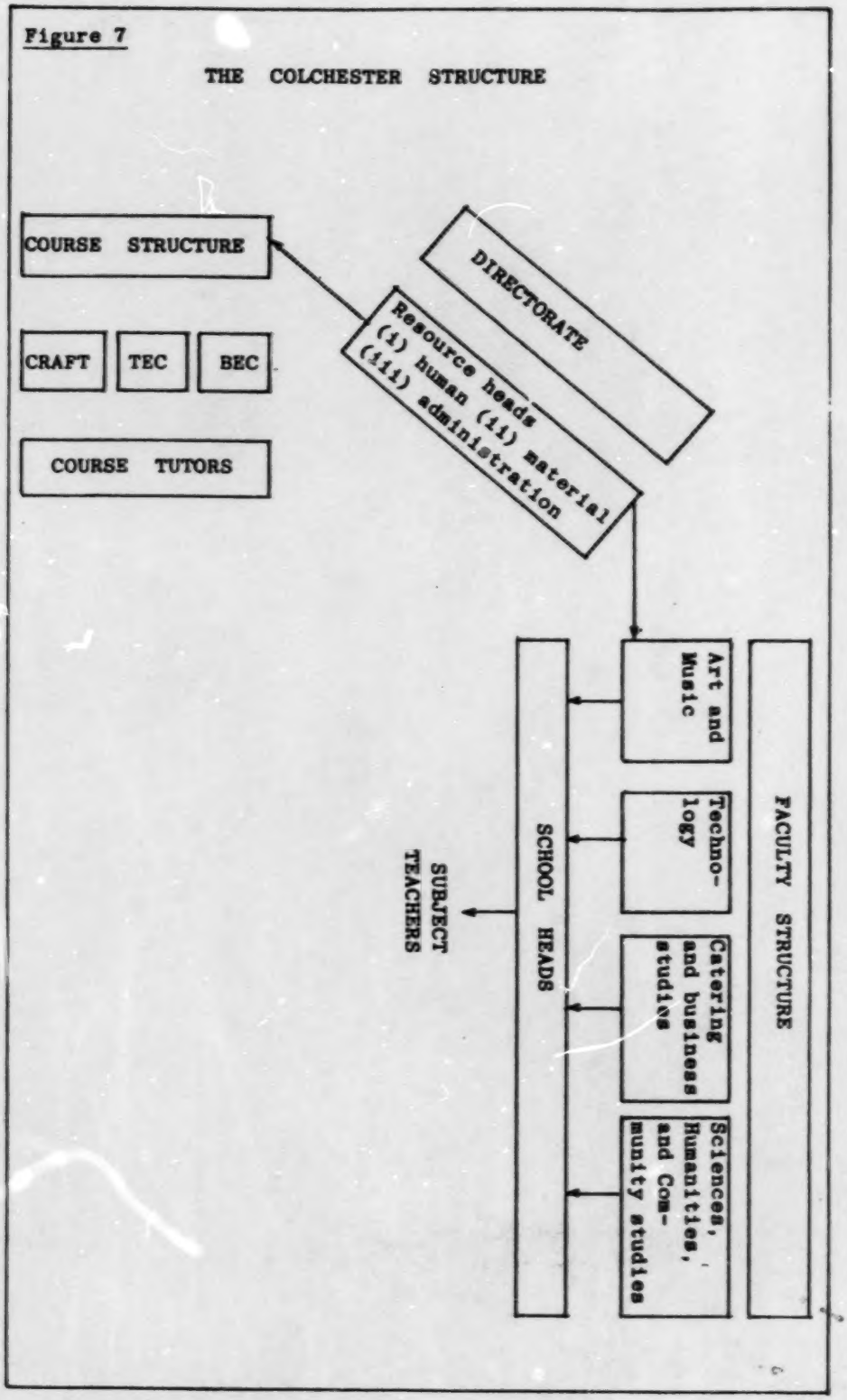

RESOURCE AXIS
HEAD OF RESOURCES
DIRECTORATE
SECTION HEADS
RESOURCES STAFF
HUMAN RESOURCES
MATERIAL RESOURCES
ADMINISTRATION
FACULTY HEAD
SCHOOL HEAD
SUBJECT LEADER
SUBJECT TEACHER
FACULTY
A
B
C
D
MATRIX
SUBJECT AXIS
DIRECTORATE
Personal Tutor
Year Tutor
Course Tutor
COURSE CO ORDINATOR
Degree & Certificate
BEC TEC Post 'O' Level
DIRECTORATE
COURSE AXIS

Figure 7

THE COLCHESTER STRUCTURE



2. Overall responsibility for maintenance of the academic structure of the faculty.

3. Oversight of the management of staff, teaching and non-teaching, in the faculty.

4. Supervision of staff development in the faculty.

5. Advising and assisting the directorate, in association with appropriate school head, on appointment of teaching and non-teaching staff.

6. Development, in association with appropriate school heads and course co-ordinators, of new and existing courses and assessment of resource needs for these courses.

7. In conjunction with heads of human and material resources, oversight of use and development of resources within the faculty.

8. Oversight of budget planning and use in the faculty.

9. Chairmanship of faculty board and participation in appropriate consultative panels.

In addition, a faculty head will have (a) a personal teaching programme and (b) other duties consistent with this grading and the role of faculty head as may be required from time to time.

School Head

A person responsible for the maintenance and development of the teaching of a group of academic subjects and the teaching staff involved. He has particular responsibilities to the director, through the faculty head, as follows:

1. For the general management of teaching staff in the school and the allocation of their duties and with the faculty head and head of human resources for the initiation and progression of staff development programmes.

2. For leadership in the maintenance and development of academic standards in the school's subjects.

3. Maintenance, with the faculty head, course co-ordinators and course tutors, of the academic standards for entry into courses served by the school.

4. Liaison with course tutors and personal tutors who are members of his school in ensuring the effective counselling of students and their referral to specialist staff or agencies as necessary.

5. Timetabling of staff of the school in consultation with the appropriate subject leaders and, as necessary, with appropriate course co-ordinators and course tutors.

6. For providing information from subject areas to enable the monitoring of student progress.

7. With the faculty head and course co-ordinators for the initiation, development and detailed

planning of new courses involving the school.

8. For the identification of need for short courses and special class provision in the school and, in association with the appropriate course co-ordinator, for mounting such courses.

9. For the utilisation and oversight of specialist rooms used by the school and the provision, care and improvement of the facilities, equipment and materials appropriate to the school, including recommendations as to new provision.

10. For providing essential statistical and publicity material from the school.

11. For the maintenance in partnership with course co-ordinators of relationships with firms, industry, commerce, schools, colleges, the careers service and bodies involved in the work of the school.

12. For setting-up and maintaining the school committee reporting to the faculty board, of which he will be a member.

13. For participation in appropriate consultative panels set up by the governing body.

In addition, a school head will have (a) a personal teaching programme and (b) other duties consistent with his grading and the role of school head as may be required from time to time.

Course Co-ordinator

A person with overall responsibility for the operation, planning and development of a group of courses throughout the institute. He is responsible to the director for:

1. Identification, with faculty heads and school heads, of course tutors and year tutors.

2. Conduct and co-ordination of courses in his group in consultation with the course tutors.

3. Maintenance, in association with appropriate faculty and school heads and course tutors, of academic standards for entry on these courses.

4. Overseeing the monitoring of progress of students within the courses in consultation with the staff involved.

5. Initiation, development and detailed planning of new courses in partnership with the faculty and school heads directly concerned.

6. Provision of essential statistical and publicity material for the group of courses.

7. Oversight of the operation of course committees, maintaining liaison with faculty and school committees and participation in consultative panels which relate to his course responsibilities.

In addition, a course co-ordinator will have (a) a personal

teaching programme, and (b) other duties consistent with his grading and the role of course co-ordinator as may be required from time to time.

Role descriptions

It should be noted that more than one of the following roles may be assumed by any lecturer at any one time:-

Course Tutor

A teacher responsible to a course co-ordinator for the day to day running of all the years and teaching groups of a particular course. Particular responsibilities include:

1. Day-to-day correspondence relating to the course as delegated by course co-ordinator.
2. Recruiting and interviewing students.
3. Allocation of individual students to personal tutors in consultation with relevant school heads.
4. Development and allocation of syllabuses and, where necessary, co-ordinating schemes of work.
5. Ensuring a proper distribution of subject matter within the course timetable.
6. Arrangements for externally assessed examinations, including ensuring the security of examination papers.
7. Oversight of the collation and distribution of reports and the maintenance of students' records.
8. Future planning and development of the course.

Year Tutor

A teacher responsible to a course tutor for a particular working group of students. Particular responsibilities include:

1. Administrative matters concerning day-to-day running of courses, including registration, notifying time-table adjustments, absentee reports, etc.
2. Collation of reports and records.
3. Arrangements for on-going assessment of work and attendance, and periodic examinations/tests where applicable.

Personal Tutor

A teacher responsible to the appropriate year and course tutor and to his school head for the pastoral care of a limited number of individual students (an aiming point of not more than 10 full time students). The personal tutor should be seen by the student as the first person to approach in connection with his problems, and should be able to refer the student for further help where necessary as follows:

Problems connected with study	- School head, subject teacher, course tutor, year tutor.
Welfare problems	- Welfare officer, student counsellor
Careers problems	- Careers officer or expert advice

In all cases a personal tutor should be ready to consult any member of the institute concerning a student's problems without the need to observe any protocol.

Subject Leader

A teacher responsible to his school head for the teaching of a subject with particular responsibilities including:

1. Maintaining, improving and co-ordinating the standards of his subject and its teaching throughout the institute.

2. General control and development of the specialist accommodation and equipment allocated to the subject.

3. Allocation of the teaching of his subject to subject teachers in his team in consultation with the school head and subject to the exigencies of the service.

4. Curriculum development in the subject.

5. Oversight of planning of schemes of work.

Subject Teacher

A teacher responsible to his subject leader and school head for the teaching of a subject with particular responsibilities including:

1. Production of a scheme of work and preparation and conduct of lessons in accordance with his timetable.

2. The setting and marking of classwork, laboratory work and homework as appropriate.

3. Setting and marking of internal examinations and the continuous assessment of students.

4. Maintenance of records of work, attendance and mark schedules.

5. Preparation of audio visual aids.

6. Development of laboratory workshop and practical work for classes as appropriate.

Resource Heads

Head of Resources (Administrative)

A person having responsibility for the planning, development and co-ordination of the administrative machinery of the institute. The particular area of co-ordination will be finance, filing and records, registration, correspondence and secretarial services. He is also clerk to the governors of the institute and to the institute's academic board.

Head of Resources (Human)

A person having responsibility for the planning, development and co-ordination of the personnel resources and welfare of the institute. The particular area of co-ordination will be staff welfare and development programmes, student welfare, student guidance and counselling, careers information and advice, residential provision and refectories, student admissions and examinations, public relations.

Head of Resources (Material)

A person having responsibility for the planning, development and co-ordination of all the material resources of the institute. The particular area of co-ordination will include, library, information services, visual and aural aids, technician services in faculties, reprographics, accommodation utilisation, transport and maintenance of buildings and grounds.

Finally, a quote from the director may be apposite:

"The success of the matrix structure as applied to the Colchester Institute will be measured ultimately by the superfluity of the directorate."

OTHER EXAMPLES OF MATRIX STRUCTURE

Fuller details of the Middlesex Polytechnic structure and of those colleges described in this paper are documented in various Coombe Lodge publications. However, it may be of interest to look at a sub-college matrix such as that planned for the Polytechnic of the South Bank, but not fully implemented to date.

This is shown in diagrammatic form in Figure 8 (page 565) and, as can be seen, it is a faculty based, faculty managed matrix structure. Within each faculty, course management is by course directors chairing relevant course boards. They would be responsible for everything connected with the course,

including students but not including teaching and physical resources. Within each faculty, staff would be grouped according to their major academic discipline into schools under the control of heads of schools. The school would control laboratories, studios, technicians, specialist equipment, and other facilities appropriate to their subject. The head of each school would be the academic leader of his subject and would be responsible for staff timetables and assignation of staff to teach on courses at the request of course directors. It can thus be seen that service teaching within the faculty would be a meaningless term since everything belongs to the faculty and courses are not linked with a particular school. The problem of cross faculty servicing would, of course, remain.

Some Opinions of Matrix Organisation

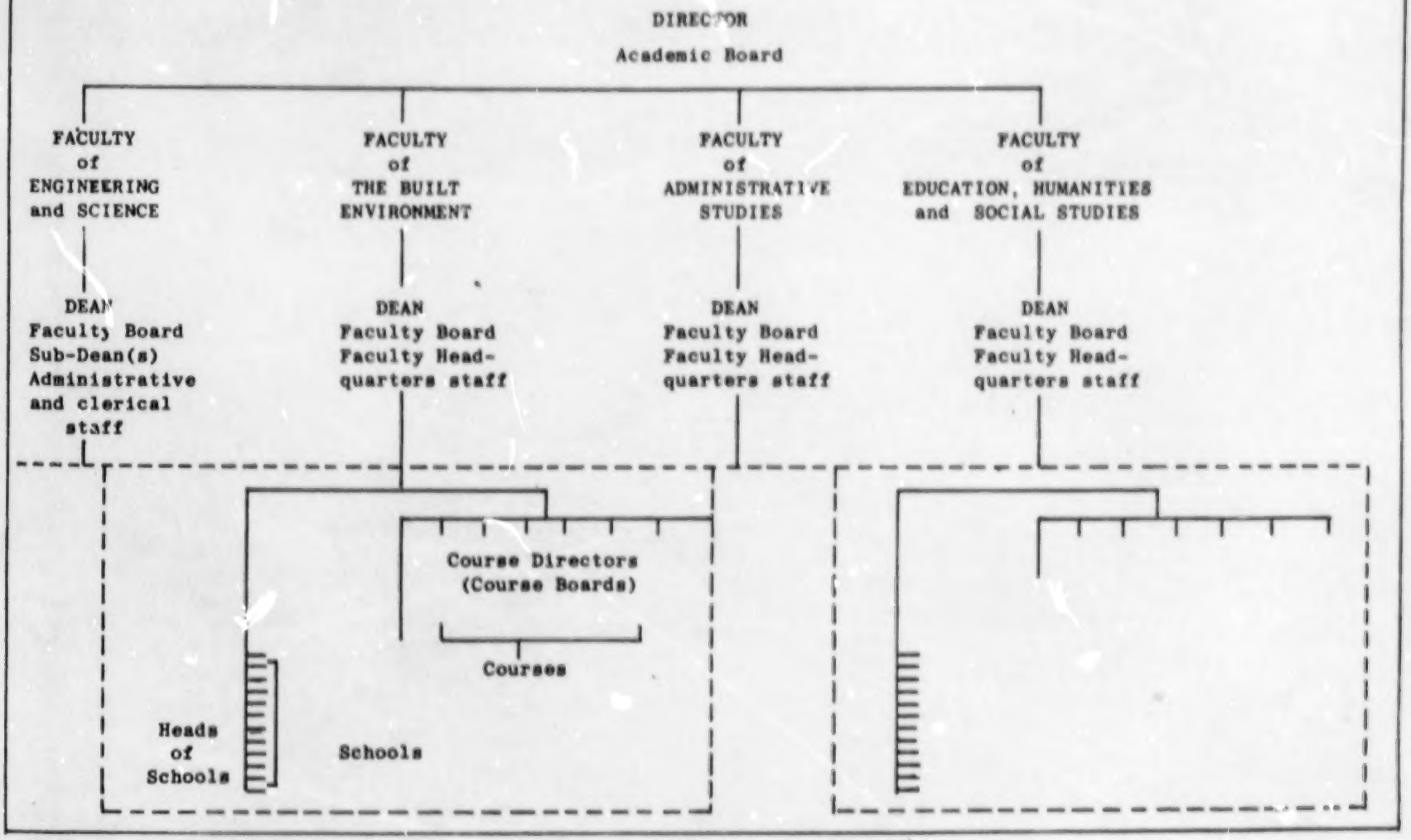
Cherns has commented that the bigger the organisation the less likely a matrix was to succeed. This seems a strange generalisation in view of the fact that the aero-space industry in the United States was one of the major cradles of matrix organisation. Cherns was speaking in the educational context and it could be that education and educational organisations present special problems for the implementation of matrix organisation. One point made by Cherns which warrants notice is that people tend to withdraw from matrix groups because of a realisation that personal career advancement depended on their own skills and the demonstration of those skills rather than the performance of their group. He pointed out that team teaching suffered from teachers' fears of losing their skill identity and this was accentuated by the matrix.

Nelson has pointed out that one of the problems identified in the educational matrix is that of divided loyalties. Teaching staff are allocated to a subject group and therefore to a resources centre. Yet their operational effort is directed to a range of courses which, organisationally, is separate. This conception of the matrix, while it may be correct academically, is not necessarily correct in the managerial sense. It may, however, have forced a recognition that the primary operational activity is the provision of courses. If this is indeed the case, then the prime importance of the course leader should be recognised. Subject leaders would have to be considered as acting in a supportive role. In fact this may have been realised, either consciously or sub-consciously, by highly qualified and experienced subject leaders who see their advancement possibilities seriously jeopardised.

Pereira-Mendoza has produced two models for departmentalisation in further and higher education, the subject based department and the course based department. He says that the close grouping of members of staff with a common academic discipline leads to fruitful development of the subject, in both teaching and research. Such a group tends to become increasingly expert because it attracts together towards academic excellence. This type of department becomes easily identified by external agencies and a reputation is built up and openings for reseach etc.

Figure 8

THE FACULTY MATRIX



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become available. Good leaders are attracted and are able to act as full academic leaders as well as administrative leaders. Thus in a subject based department the career structure and prospects are readily apparent since the person in charge is familiar with both the personal professional attributes of members of his staff and also the possible suitable promotion prospects within the department.

However, members of staff in a course based department are qualified in one or more of the subjects taught which are constituent parts of the courses. Thus a wider spread of subjects rather than depth may be preferable. Course based departments do not always suit those members of staff who subscribe to a minor discipline which happens to form part of a course taught in the department. Although they may be identified and identify themselves with the courses taught, it is highly likely that they will be denied the full academic and professional development that would be theirs in a subject based department. Another danger is the possibility of making inappropriate staff appointments in minority subjects due to the lack of anyone with expert knowledge of the subject who can judge the applicants. A related danger which has become apparent recently is the failure to recognise the need for a particular specialist in a minority subject and the belief that another member of staff, with a little development, could undertake this specialist work. The motivation to do this may well grow in the present economic climate. It is likely to be more prevalent in course based departments. Obviously with many courses this would not be undesirable and could lead to useful re-deployment, but in advanced courses it might lead to a lowering of standards.

It is, of course, true that traditional hierarchical departments in colleges are usually mixtures of these two models in varying proportions with the advantages and disadvantages that such a mixture entails. The relative advantages and disadvantages of the 'mixed' vis-a-vis the matrix are listed below. However, the points made by Peirera-Mendoza in his two models apply with equal force in the separation that takes place in the matrix by having courses on one axis with the appropriate control system and resources/subjects on the other axis with their control systems. Thus the frustrations of the subject specialists when operating in course based systems will be accentuated by the development of a system of course supremacy as mentioned by Nelson.

However, one major disadvantage of the traditional department is the discouragement of new growth as a separate entity on the grounds that strong subject ties bind it to its parent department. Similarly the development of new subjects required by new courses tends to become the prerogative of the same department and thus there appears to be little constraint to proliferation and growth. It is quite apparent that the matrix does not encourage this type of growth as, although the motivation for some new subject discipline may come from the course axis, it will be the subject axis which develops it.

ADVANTAGES AND DISADVANTAGES OF HIERARCHICAL AND MATRIX STRUCTURES

Advantages and disadvantages in both the matrix structure and in the hierarchical (departmental) structure are listed below:-

Hierarchical (Departmental) Structure. Disadvantages.

1. Difficulty in adjusting to changing demands, e.g. decline in engineering and growth in business studies.
2. Problems in adjusting to inter-disciplinary and modular courses and in-service teaching.
3. Tendency towards inertia and entrenched views.
4. Empire building.
5. Conflict between college goals and departmental goals.
6. Over identification with subject discipline.
7. Inward looking approach.
8. Demarcation disputes.
9. Problems caused by size differences.
10. Problems caused by a 'difficult' head of department.

Hierarchical Structure. Advantages.

1. Empire building may and can give rise to excellence and can thus attract students and good staff.
2. The identification with a discipline will also produce professionalism with its advantages.
3. The inculcation of team spirit.
4. A more easily developed staff student relationship.
5. Lines of authority and communication are more clearly seen.

Matrix Structure. Disadvantages

1. Both staff and students are responsible to two or more leaders with consequent possible dis-orientation.
2. A feeling of lack of identity (as can happen in a department).
3. The lack of a feeling of security.
4. Apparent structural complexity.
5. The engendering of frustration caused by the primacy of the course leader with

the subject leader in a supportive role.

Matrix Structure. Advantages

1. Combination of a permanent college organisation with temporary projects, i.e. courses.
2. End problems involved in interdisciplinary and modular courses and in-service teaching. (It can be said that all teaching is service teaching.)
3. Reduces the influence of 'bad' senior staff.
4. Lateral communications are easier.
5. Can end conflict between college and sub-college goals.
6. Can reduce empire building.
7. Allows for optimum flexibility.

Obviously the items of advantage and disadvantage in the list are not of equal weighting and the fact that there are unequal numbers in the lists has no significance.

CONCLUSIONS

The first two alternatives to the departmental hierarchical structure need not in themselves be radical departures from hierarchy and may, in fact, be used as alternative hierarchical structures. They may also be used in association with a matrix, either as a supra-matrix college based structure with the matrix used as a faculty structure as in the Polytechnic of the South Bank, or as component axes of a college based matrix as at Colchester and Yeovil.

There would seem to be evidence that the objective of achieving greater lateral communication is facilitated by replacing the traditional hierarchical structure by a matrix structure, although this can be achieved in part by other means, such as a faculty structure with sub-faculty matrices. It would also seem that the vulnerability of the college to human failure is less in a college structured on matrix lines than on hierarchical lines, and that the adoption of a matrix structure forces the recognition that the primary operational activity of the college is the provision of courses. However, it must be recognised that acceptance of this letter conclusion also implies the primacy of the course leader and that the subject leader has a supportive role, with all the difficulties that that may cause.

In conclusion it may be apposite to quote from a review paper by Knight on matrix organisation:

"In spite of inconsistencies, the idea of dual structures seems to be acquiring increasing momentum. Matrix or similar structures are springing up wherever one looks, and the sooner we find out how to

organise and operate them harmoniously and effectively, the better it will be for people who work in them".

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Yeovil College has recently published a new document "Yeovil College - aims and organisation" which supersedes the above publication. It is available from Yeovil College, Ilchester Road, Yeovil, Somerset, price £0.50p.

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